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⑤④ **Detergent compositions containing cellulase.**

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EP-A- 0 120 528
EP-A- 0 206 513

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Description

Technical Field

- 5 The present invention relates to detergent compositions which comprise a detergent cellulase and a low level of a narrowly defined polymer. Preferred compositions further contain a fabric-softening clay.

Background

- 10 The present invention relates to detergent compositions comprising a detergent cellulase. The compositions are formulated to provide a near-neutral or mildly alkaline wash liquor pH. They contain a low level of a narrowly defined soil release polymer.

The use of cellulolytic enzymes, i.e. cellulase, as a harshness reducing agent in fabric softening compositions, is taught in British Patent 1.368.599.

- 15 The use of cellulase in detergent compositions has been further disclosed in GB-A-2,075,028; GB-A-2,095,275; GB-A-2,094,826 and Jap. Patent 57108-199.

EP-A 0 120 528 teaches alkaline softening detergent compositions comprising a synergistic mixture of a water-insoluble C₁₀-C₂₆ tertiary amine and cellulase.

- 20 EP-A 0 177 165 discloses alkaline softening detergent compositions containing a mixture of smectite clay and cellulase.

To date however detergent cellulases have not found wide acceptance in the detergent industry. One reason is that the interaction of cellulase and other, more conventional detergent ingredients is poorly understood. Another reason is that compositions formulated according to art-disclosed recipes do not use cellulase at their optimum pH-range.

- 25 To date as well, the tendency in the formulation of detergent compositions has been to increase the pH of the compositions (clearly above 10) in order to boost cleaning performance, especially on clay soil stains. However, at such alkaline pH ranges commercially available detergent cellulases do not provide optimum performance; there is, consequently, a standing need for compositions formulated at pH below 10, which show optimum cellulase performance, while having good clay soil cleaning properties.

- 30 The present invention answers the above need, and provides efficient near neutral or mildly alkaline detergent compositions, which exhibit good cleaning properties, especially on cotton fabrics.

EP-A 0 112 593 describes alkoxyated amines having clay-soil removal/anti-redeposition properties when used in detergent compositions. EP-A 0 137 615 describes solvent-based liquid detergent compositions containing alkoxyated polyamines.

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Summary of the Invention

- 40 The present invention relates to detergent compositions comprising a surface-active agent and a detergent cellulase. The detergent compositions of this invention are characterized in that they contain from 0.1% to 1% of an alkoxyated polyamine as defined herein below, and in that the pH of a 1% solution of the detergent compositions in distilled water is from 6.5 to 9.5. Preferred are detergent compositions which further comprise from 1% to 20% of a fabric softening clay material, preferably a bentonite clay. Preferred are also compositions that are essentially free of water-insoluble, long-chain alkyl amines, or derivatives thereof.

- 45 The detergent cellulase is preferably a bacterial or fungal cellulase having an optimum pH in the range of from 5 to 11.5, more preferably from 6.5 to 9.5. The amount of cellulase in the composition is preferably such that the cellulase activity of the composition ranges from 5 to 100 CMCase units per gram.

Preferred are further compositions that comprise from 0.5% to 5% of a water-soluble quaternary ammonium compound.

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Detailed Description of the Invention

- For optimum performance of detergent cellulases it is desirable to formulate detergent compositions having a pH in 1% aqueous solution in the range of from 6.5 to 9.5. As may be expected, the clay soil removal performance of such compositions is relatively poor as compared to compositions formulated to provide a wash liquor pH of 10 or above.

Certain water-soluble quaternary ammonium compounds are highly desirable as cationic co-surfactants in detergent compositions, as these compounds provide important greasy soil removal benefits. Due to their

positive charge, however, these cationics tend to negatively interact with the clay soil removal performance of a detergent composition. This effect is more pronounced at relatively low pH, at which clay particles are less able to peptize viz negative charge repulsion effects than at pH>10.

It has now been found that relatively small amounts of a narrowly defined alkoxyated polyamine clay soil removal polymer off-set the negative effects on clay soil removal performance as result from a pH of 9.5 or below, and from the negative interaction of water-soluble quaternary ammonium compounds. It has further been found that the presence of this clay soil release polymer at the pH specified does not affect the deposition of such clays as may be used to provide fabric softening benefits (e.g., bentonite clays). Hence, the preferred compositions of this invention address the conflicting needs of removing clay soil, while leaving the deposition of desirable softening clays unimpaired. This highly surprising result may be due to the relatively low level of clay soil release polymer that is sufficient to obtain satisfactory clay soil removal with the compositions of the present invention.

The surface-active agent

The surface-active agent useful herein preferably contains at least 50% by weight, more preferably from 60% to 100% by weight of the surface active agent of a non-soap anionic surface-active agent (salt form). A wide range of anionic surfactants can be used in the compositions of the present invention.

Suitable anionic surfactants are water-soluble salts of alkyl benzene sulphonates, alkyl sulphates, alkyl polyethoxy ether sulphates, paraffin sulphonates, alpha-olefin sulphonates, alpha-sulphocarboxylates and their esters, alkyl glyceryl ether sulphonates, fatty acid monoglyceride sulphates and sulphonates, alkyl phenol polyethoxy ether sulphates, 2-acyloxy-alkane-1-sulphonates, and beta-alkyloxy alkane sulphonates.

Particularly preferred alkyl benzene sulphonates have from 9 to 15 carbon atoms in a linear or branched alkyl chain, especially from 11 to 13 carbon atoms. Suitable alkyl sulphates have from 10 to 22 carbon atoms in the alkyl chain, more especially from 12 to 18 carbon atoms. Suitable alkyl polyethoxy ether sulphates have from 10 to 18 carbon atoms in the alkyl chain and have an average of from 1 to 12 -CH₂CH₂O- groups per molecule, especially from 10 to 16 carbon atoms in the alkyl chain and an average of from 1 to 6 -CH₂CH₂O-groups per molecule.

Suitable paraffin sulphonates are essentially linear and contain from 8 to 24 carbon atoms, more particularly from 14 to 18 carbon atoms. Suitable alpha-olefin sulphonates have from 10 to 24 carbon atoms, more particularly from 14 to 16 carbon atoms; alpha-olefin sulphonates can be made by reaction with sulphur trioxide, followed by neutralization under conditions such that any sulfones present are hydrolyzed to the corresponding hydroxy alkane sulphonates. Suitable alpha-sulphocarboxylates contain from 6 to 20 carbon atoms; included herein are not only the salts of alpha-sulphonated fatty acids but also their esters made from alcohols containing 1 to 14 carbon atoms.

Suitable alkyl glyceryl ether sulphates are ethers of alcohols having from 10 to 18 carbon atoms, more particularly those derived from coconut oil and tallow. Suitable alkyl phenol polyethoxy ether sulphates have from 8 to 12 carbon atoms in the alkyl chain and an average of from 1 to 6 -CH₂CH₂O-groups per molecule. Suitable 2-acyloxyalkane-1-sulphonates contain from 2 to 9 carbon atoms in the acyl group and from 9 to 23 carbon atoms in the alkane moiety. Suitable beta-alkyloxy alkane sulphonates contain from 1 to 3 carbon atoms in the alkyl group and from 8 to 20 carbon atoms in the alkane moiety.

The alkyl chains of the foregoing anionic surfactants can be derived from natural sources such as coconut oil or tallow, or can be made synthetically as for example by using the Ziegler or Oxo processes. Water-solubility can be achieved by using alkali metal, ammonium, or alkanol-ammonium cations; sodium is preferred. Mixtures of anionic surfactants are contemplated by this invention; a satisfactory mixture contains alkyl benzene sulphonate having 11-13 carbon atoms in the alkyl group and alkyl sulphate having 12 to 18 carbon atoms in the alkyl group.

Nonionic surfactants may be incorporated in the compositions herein, in limited amounts (less than 50%). Suitable nonionics are water-soluble ethoxylated materials of HLB 11.5-17.0 and include (but are not limited to) C₁₀-C₂₀ primary and secondary alcohol ethoxylates and C₅-C₁₀ alkylphenol ethoxylates. C₁₄-C₁₈ linear primary alcohols condensed with from seven to thirty moles of ethylene oxide per mole of alcohol are preferred, examples being C₁₄-C₁₅ (EO)₇, C₁₆-C₁₈ (EO)₂₅ and especially C₁₆-C₁₈ (EO)₁₁.

Other types of surfactants can be used in limited amounts, in combination with the anionic surface-active agent. They include zwitterionic amphoteric, as well as cationic surfactants.

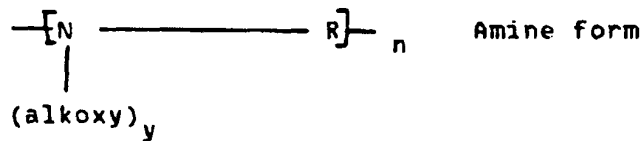
Cationic co-surfactants which can be used herein, include water-soluble quaternary ammonium compounds of the form R₄R₅R₆R₇N⁺X⁻, wherein R₄ is alkyl having from 10 to 20, preferably from 12-18 carbon atoms, R₅, R₆ and R₇ are independently, C₁-C₄ alkyl, and X⁻ is an anion, e.g. chloride. Examples are the trimethyl ammonium compounds, including C₁₂-C₁₄ alkyl trimethyl ammonium chloride and cocoalkyl

trimethyl ammonium m thosulfate.

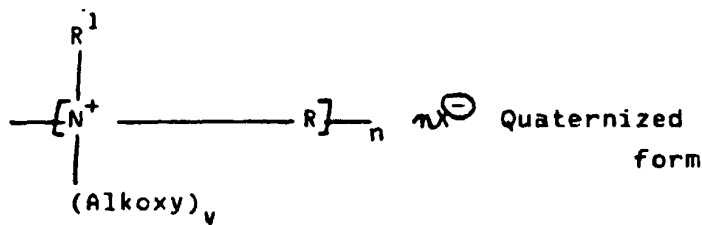
Polyamines

Alkoxylated polyamines suitable as clay-soil removal/anti-redeposition agents, as well as their preparation, are disclosed in EP-PA 0 112 593, the disclosures of which are incorporated herein by reference.

It is to be understood that the term "polyamines" as used herein represents generically the alkoxylated polyamines, both in their amine form and in their quaternized form. Such materials can conveniently be represented as molecules of the empirical structures with repeating units :

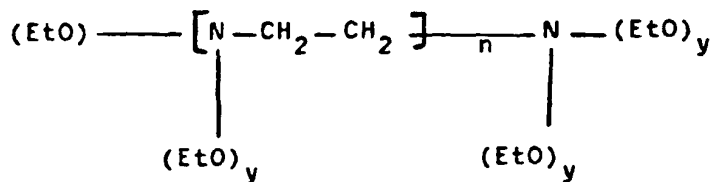


and



Wherein R is a hydrocarbyl group, usually of 2-6 carbon atoms; R¹ may be a C₁-C₂₀ hydrocarbon; the alkoxy groups are ethoxy, propoxy, butoxy and the like, and y is 2-30, most preferably 10-20; n is an integer of at least 2, preferably from 2-20, most preferably 3-5; and X⁻ is an anion such as halide or methylsulfate, resulting from the quaternization reaction.

The most highly preferred polyamines for use herein are the so-called ethoxylated polyethylene imines, i.e., the polymerized reaction product of ethylene oxide with ethylene-imine, having the general formula :



wherein n is an integer of 3 to 5 and y is an integer of 10 to 20.

The Cellulase

The cellulase usable in the present invention may be any bacterial or fungal cellulase having a pH optimum of between 5 and 9.5.

Suitable cellulases are disclosed in GB-A-2.075.028; GB-A-2.095.275 and DE-OS-2.247.832.

Examples of such cellulases are cellulases produced by a strain of *Humicola insolens* (*Humicola grisea* var. *thermoidea*), particularly the *Humicola* strain DSM 1800, and cellulases produced by a fungus of *Bacillus N* or a cellulase 212-producing fungus belonging to the genus *Aeromonas*, and cellulase extracted from the hepatopancreas of a marine mollusc (*Dolabella Auricula* Solander).

The cellulase added to the composition of the invention may be in the form of a non-dusting granulate,

e.g. "marumes" or "prills", or in the form of a liquid in which the cellulase is provided as a cellulase concentrate suspended in e.g. a nonionic surfactant or dissolved in an aqueous medium.

Activity determination for the cellulase herein is based on the hydrolysis of carboxymethyl cellulose. Generated low molecular reducing carbohydrates are colorimetrically determined by the ferrocyanide
 5 reaction as described by W.S. Hoffman "J. Biol. Chem." 120,51 (1973). Key conditions of incubation are pH-7.0, temperature of 40° C and incubation time of 20 minutes.

One CMCase unit is defined as the amount of enzyme which forms per minute an amount of reducing carbohydrate equivalent to 10^{-6} mole of glucose, in the above-described conditions.

A highly preferred range of cellulase activity in the present context is from 5 to 100 CMCase activity
 10 units/gram of composition.

Preferred compositions herein are essentially free of water-insoluble long-chain alkyl amine softening agents, and derivatives thereof, since it has surprisingly been discovered that such compounds negatively interact with cellulase under the pH conditions as used herein. The cellulase-incompatible amines generally have the formula $R_8R_9R_{10}N$, wherein R_8 and R_9 are, independently, C_{10} - C_{22} alkyl, and R_{10} is hydrogen or
 15 C_1 - C_3 alkyl. Derivatives of these amines like, e.g., the corresponding amides, also negatively interact with cellulase.

The compositions herein are formulated at a pH in the range of from 6.5 to 9.5, measured as a 1% solution of the composition in distilled water.

At this pH-range, the cellulase for use herein have their optimum performance.

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Optional Ingredients

The compositions herein may contain, in addition to the essential ingredients, optional ingredients, which can be highly desirable.

25 For example, it is preferred that the compositions herein contain a clay softening agent, in combination with the cellulase. Such clay softening agents are well-known in the detergency patent literature and are in broad commercial use, both in Europe and in the United States. Included among such clay softeners are various heat-treated kaolins and various multi-layer smectites. Preferred clay softeners are smectite softener clays that are described in German patent document 23 34 899 and in U.K. patent 1,400,898, which can be
 30 referred to for details.

The most preferred clay fabric softening materials include those materials of bentonitic origin, bentonites being primarily montmorillonite type clays together with various impurities, the level and nature of which depends on the source of the clay material. Softener clays are used in the preferred compositions at levels of at least 1%, generally 1-20%, preferably 2-10%. Surprisingly, the alkoxy polyamine does not
 35 negatively interact with the deposition of softener clays.

It is preferred as well that the detergent compositions contain a detergent builder and/or metal ion sequestrant. Compounds classifiable and well-known in the art as detergent builders include the nitrilotriacetates, polycarboxylates, citrates, water-soluble phosphates such as tri-polyphosphate and sodium ortho- and pyro-phosphates, and mixtures thereof. Metal ion sequestrants include all of the above, plus
 40 materials like ethylenediaminetetraacetate, the amino-polyphosphonates and a wide variety of other polyfunctional organic acids and salts too numerous to mention in detail here. See U.S. Patent 3,579,454 for typical examples of the use of such materials in various cleaning compositions. Preferred polyfunctional organic acids species for use herein are citric acid, ethylene diamine tetramethylenephosphonic acid, and diethylene triaminepentamethylenephosphonic acid.

45 A further class of detergency builder materials useful in the present invention are insoluble sodium aluminosilicates. The 1-10 μ m size zeolite (e.g., zeolite A) builders disclosed in German Patent 24.22.655 are especially preferred for use in low-phosphate or non-phosphate compositions. In general, the builder/sequestrant will comprise from 0.5% to 45% of the composition.

The compositions herein can also contain fatty acids, saturated or unsaturated, and the corresponding
 50 soaps. Suitable fatty acids, saturated or unsaturated, have from 10 to 18 carbon atoms in the alkyl chain. Preferred are unsaturated species having from 14 to 18 carbon atoms in the alkyl chain, most preferably oleic acid. The corresponding soaps can also be used. The optional fatty acid/soaps are used in levels up to 20%.

The compositions herein can also contain compounds of the general formula $R-CH(COOH)CH_2(COOH)$
 55 i.e. derivatives of succinic acid, wherein R is C_{10} - C_{20} alkyl or alkenyl, preferably C_{12} - C_{16} , wherein R may be substituted with hydroxyl, sulfo, sulfoxy or sulfone substituents.

The succinate builders are preferably used in the form of their water-soluble salts, including the sodium, potassium, ammonium and alkanoammonium salts.

Specific examples of succinate builders include : lauryl succinate, myristyl succinate, palmityl succinate, 2-dodecenyl succinate (preferred), 2-pentadecenyl succinate, and the like.

Also useful as builders in the present context are the compounds described in US patent 4.663.071, i.e. mixtures of tartrate monosuccinic acid and tartrate disuccinic acid in a weight ratio of monosuccinic to disuccinic of from 97:3 to 20:80, preferably 95:5 to 40:60.

Another optional ingredient is a bleaching agent. Preferred are peroxygen bleaching agents such as sodium perborate, commercially available in the form of mono- and tetra-hydrates, sodium carbonate peroxyhydrate, sodium pyrophosphate peroxyhydrate and urea peroxyhydrate.

Bleach activators may be used in combination with the above peroxygen bleaching agents. Classes of bleach activators include esters, imides, imidazoles, oximes, and carbonates. In those classes, preferred materials include methyl o-acetoxy benzoates; sodium-p-acetoxy benzene sulfonates such as sodium 4-octanoyloxybenzene sulfonate; sodium-4-octanoyloxybenzene sulfonate, and sodium-4-decanoyloxybenzenesulfonate; biophenol diacetate; tetra acetyl ethylene diamine; tetra acetyl hexamethylene diamine; tetra acetyl methylene diamine.

Other highly preferred peroxygen bleach activators which are disclosed in U.S. Patents 4,483,778 and 4,539,130, are alphi-substituted alkyl or alkenyl esters, such as sodium-4(2-chlorooctanoyloxy) benzene sulfonate, sodium 4-(3,5,5-trimethyl hexanoyloxy)benzene sulfonate. Suitable peroxyacids are also peroxygen bleach activators such as described in published European Patent Application 0 166 571, i.e., compounds of the general type RXA₂OOH and RXAL, wherein R is a hydroxycarbonyl group, X is a heteroatom, A is a carbonyl bridging group and L is a leaving group, especially oxybenzenesulfonate.

Enzymes other than cellulases, such as proteolytic, amylolytic, or lipolytic enzymes can be used in combination with the cellulase herein. All generally known enzyme stabilizing systems can be used in the liquid executions of the compositions herein at the art established levels. Examples of suitable stabilizing systems include short C₁₋₄ chain carboxylic acid, particularly formic acid in combination with a low level of calcium, boric acid and the water-soluble salts thereof possibly in combination with polyols.

Moreover, the compositions herein can contain, in addition to ingredients already mentioned, various other optional ingredients typically used in commercial products to provide aesthetic or additional product performance benefits. Typical ingredients include pH regulants, perfumes, dyes, optical brighteners, soil suspending agents, hydrotropes and gel-control agents, freeze-thaw stabilizers, bactericides, preservatives, suds control agents, bleach stabilizing agents.

Form and Preparation of the compositions

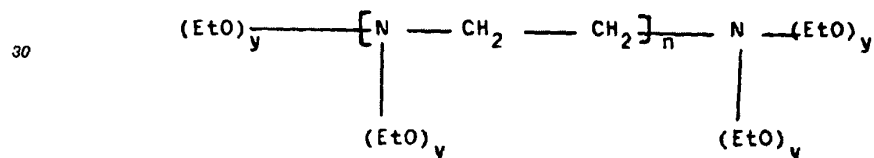
The detergent compositions of this invention can be present in any suitable physical state inclusive of granular, liquid, pasty, or sheet-like form. They may be prepared in any way, as appropriate to their physical form, by mixing the components, co-agglomerating them, micro-encapsulating them, dispersing them in a liquid carrier, and releasably adsorbing or coating them onto a non-particulate substrate, such as a non-woven or paper sheet.

The following examples illustrate the present invention, but are not intended to limit its scope.

Example I

Granular detergents were prepared, having the following compositions :

| | <u>ingredients</u> | <u>% by weight</u> | |
|----|---|--------------------|------|
| | | A | B |
| 5 | | | |
| | Sodium linear C ₁₂ alkyl sulfonate | 11.0 | 7.0 |
| | Sodium tallow alkyl sulfate | 5.0 | - |
| 10 | Tallow alcohol ethoxylate | 0.3 | 1.0 |
| | Sodium tripolyphosphate | 24.0 | 23.5 |
| | Bentonite clay | 8.5 | 6.4 |
| | Coconuttrimethyl ammonium chloride | - | 1.6 |
| 15 | Boric acid | - | 4.0 |
| | Cellulase (1350 CMCase units/g) | 3.0 | 3.5 |
| | Proteolytic enzyme | 0.9 | 0.5 |
| 20 | Clay soil release polymer* | 0.5 | 0.3 |
| | Sodium sulfate, minors, water | balance to 100 | |
| 25 | pH (1% solution in distilled water) | 8.7 | 9.0 |



35 wherein n=4 and y=15 .

The following granular compositions were also prepared :

40

45

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| | <u>ingredient</u> | <u>% by weight</u> | |
|----|---|--------------------|--------------------|
| | | <u>Example II</u> | <u>Example III</u> |
| 5 | | | |
| | Sodium Linear C ₁₂ alkyl benzene sulfonate | 7.0 | 6.5 |
| | C ₁₃₋₁₅ fatty alcohol/11 ethylene oxide | | |
| 10 | condensate | 1.0 | 0.5 |
| | Sodium sulfate | 15.0 | 15.0 |
| | Sodium tripolyphosphate | 24. | - |
| | Zeolite A | - | 26.0 |
| 15 | Sodium nitrilotriacetate | - | 5.0 |
| | Bentonite clay | 6.5 | 6.5 |
| | Cellulase | 3.5** | 3.5** |
| | Proteolytic enzyme | 0.5 | 0.5 |
| 20 | Sodium Perborate tetrahydrate | 20.0 | 20.0 |
| | TAED* | 1.2 | 3.0 |
| | Boric acid | 4.0 | 4.0 |
| 25 | Optical brightener | 0.3 | 0.5 |
| | Clay soil removal polymer*** | 0.4 | 0.6 |
| | minors and water | ---balance--- | |
| 30 | pH (1% solution in distilled water) | 9.0 | 9.0 |

***As per example I

**Represents 47CMCase units per g of composition

35 *tetra acetyl ethylene diamine

Example IV

40

The following liquid detergent composition was also prepared :

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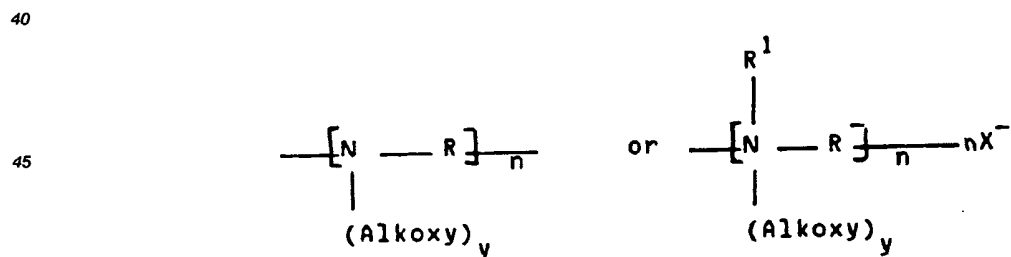
| | <u>ingredient</u> | <u>% by weight</u> |
|----|---|--------------------|
| 5 | Linear C ₁₂ alkyl benzene sulphonic acid | 11.0 |
| | Coconut alkyl sulphate (TEA salt) | 4.0 |
| | Tallow C ₁₂₋₁₅ alcohol ethoxylate (EO7) | 10.0 |
| | Coconut fatty acid | 10.0 |
| 10 | Oleic acid | 5.0 |
| | Citric acid | 1.0 |
| | Trethanolamine | 4.0 |
| 15 | Ethanol | 6. |
| | Propanediol | 1.5 |
| | Sodium hydroxide | 3. |
| 20 | Sodium formate | 1. |
| | Cellulase | 2.5* |
| | Protease | 0.6 |
| | Clay soil removal polymer** | 0.3 |
| 25 | minors, water | balance |

*Represents 34CMCase units per g composition

30 **As per example I

Claims

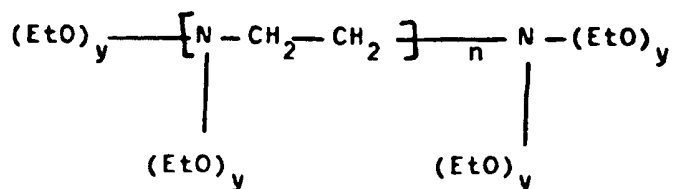
- 35 1. A detergent composition (for the cleaning and softening of fabrics) comprising a surface-active agent and a detergent cellulase, characterized in that :
- 40 - the composition contains from 0.1% to 1% of a clay-soil release polymer having the repeated units



50 wherein R is hydrocarbyl having from 2 to 6 carbon atoms, R¹ is C₁ to C₂₀ hydrocarbon, alkoxy is selected from ethoxy, propoxy, butoxy, or mixtures thereof, y is 2-30, n is an integer of at least 2, and X⁻ is an anion; and

55 - the pH of a 1% solution of the detergent composition in distilled water is from 6.5 to 9.5.

2. A composition according to Claim 1 wherein the alkoxyated polyamine is the polymerized reaction product of ethylene oxide with ethylene imine, having the general formula:

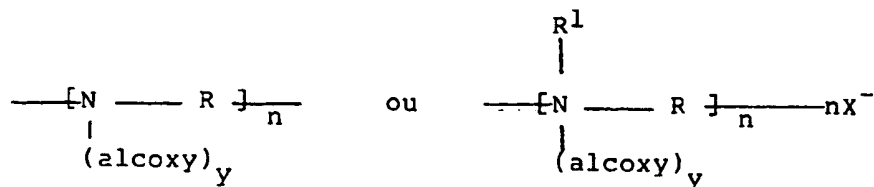


wherein n is an integer from 3 to 5 and y is an integer from 10 to 20.

3. A composition according to claim 2 wherein the cellulase has an optimum pH in the range from 6.5 to 9.5.
4. A composition according to any one of the preceding claims having a cellulase activity of from 5 to 100 CMCase units per gram of composition.
5. A composition according to any one of the preceding claims, wherein the surface active agent contains from 60% to 100% by weight of anionic surface-active agent.
6. A composition according to any one of the preceding claims which further comprises from 1% to 20% of a fabric-softening clay material.
7. A composition according to any one of the preceding claims which further comprises from 0.5% to 5% of a water-soluble quaternary ammonium compound of the formula $\text{R}_4\text{R}_5\text{R}_6\text{R}_7\text{N}^+\text{X}^-$, wherein R_4 is alkyl having from 10 to 20 carbon atoms, R_5 , R_6 and R_7 are, independently, C_1 - C_4 alkyl, and X^- is an anion.
8. A composition according to any one of the preceding claims, further characterized in that it is essentially free of water-insoluble long chain alkyl amines or derivatives thereof.
9. A composition according to any one of the preceding claims characterized in that the pH of a 1% solution of the composition in distilled water is from 8.5 to 9.5.

Revendications

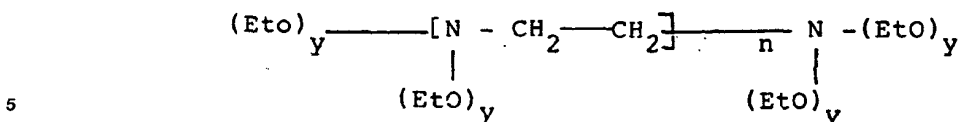
1. Une composition détergente (pour le nettoyage et l'assouplissement des tissus) comprenant un agent de surface et une cellulase détergente, caractérisée en ce que
 - la composition contient 0,1% à 1% d'un polymère qui détache les salissures argileuses comportant les motifs



dans lesquels R est un hydrocarbyle possédant 2 à 6 atomes de carbone, R^1 est un groupe hydrocarboné en C_1 à C_{20} , l'alcoxy est choisi parmi les éthoxy, propoxy, butoxy ou leurs mélanges, y est 2-30, n est un nombre entier d'au moins 2 et X^- est un anion, et

- le pH d'une solution à 1% de la composition détergente dans de l'eau distillée s'étend de 6,5 à 9,5.

2. Une composition selon la revendication 1, dans laquelle la polyamine alcoylée est le produit de réaction polymérisé de l'oxyde d'éthylène avec de l'éthylène-imine, répondant à la formule générale :

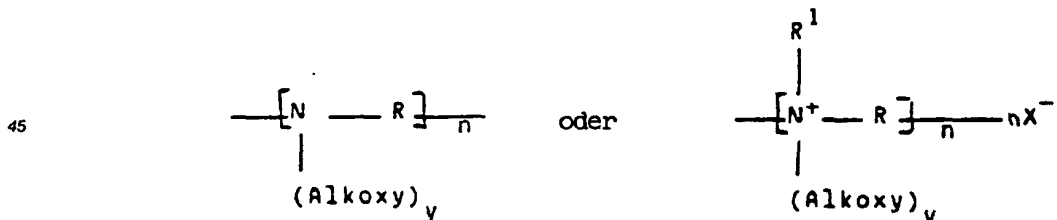


dans laquelle n est un nombre entier de 3 à 5 et y est un nombre entier de 10 à 20.

3. Une composition selon la revendication 2, dans laquelle la cellulase possède un pH optimal dans la gamme de 6,5 à 9,5.
4. Une composition selon l'une quelconque des revendications précédentes possédant une activité cellulase de 5 à 100 unités CMCase par gramme de composition.
5. Une composition selon l'une quelconque des revendications précédentes, dans laquelle l'agent de surface contient 60% à 100% en poids d'un agent de surface anionique.
6. Une composition selon l'une quelconque des revendications précédentes qui contient en outre 1% à 20% d'une matière argileuse pour l'assouplissement des tissus.
7. Une composition selon l'une quelconque des revendications précédentes qui contient en outre 0,5% à 5% d'un composé d'ammonium quaternaire soluble dans l'eau de formule $R_4R_5R_6R_7N^+X^-$ où R_4 est un alkyle comportant 10 à 20 atomes de carbone, R_5 , R_6 et R_7 sont, indépendamment, un alkyle en C_1 - C_4 et X^- est un anion.
8. Une composition selon l'une quelconque des revendications précédentes, caractérisée en outre en ce qu'elle est essentiellement exempte d'alkylamines à longue chaîne insolubles dans l'eau ou de leurs dérivés.
9. Une composition selon l'une quelconque des revendications précédentes, caractérisée en ce que le pH d'une solution à 1% de la composition dans de l'eau distillée s'étend de 8,5 à 9,5.

Patentansprüche

1. Detergengzusammensetzung (für die Reinigung und Weichmachung von Geweben), umfassend ein grenzflächenaktives Mittel und eine Detergencellulase, dadurch gekennzeichnet, daß:
 - die Zusammensetzung 0,1 % bis 1 % eines Tonschmutz-Lösepolymeren mit den sich wiederholenden Einheiten

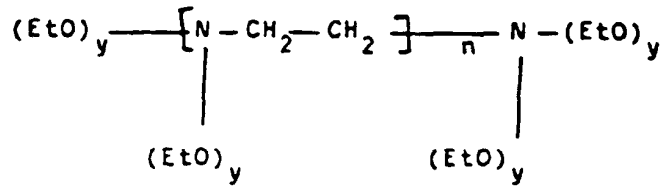


enthält, worin R eine Kohlenwasserstoffgruppe mit 2 bis 6 Kohlenstoffatomen bedeutet, R^1 ein C_1 - C_{20} -Kohlenwasserstoff ist, Alkoxy unter Ethoxy, Propoxy, Butoxy oder Gemischen hiervon ausgewählt ist, y von 2-30 beträgt, n eine ganze Zahl von mindestens 2 ist und X^- ein Anion darstellt; und

- der pH-Wert einer 1%igen Lösung der Detergengzusammensetzung in destilliertem Wasser von 6,5 bis 9,5 beträgt.

2. Zusammensetzung nach Anspruch 1, worin das alkoxylierte Polyamin das polymerisierte Reaktionspro-

dukt aus Ethylenoxid und Ethylenimin ist, welches die allgemeine Formel:



aufweist, worin n eine ganze Zahl von 3 bis 5 ist und y eine ganze Zahl von 10 bis 20 bedeutet.

3. Zusammensetzung nach Anspruch 2, worin die Cellulase ein Optimum bei einem pH-Wert im Bereich von 6,5 bis 9,5 besitzt.
4. Zusammensetzung nach einem der vorstehenden Ansprüche mit einer Cellulaseaktivität von 5 bis 100 CMCase-Units je Gramm an Zusammensetzung.
5. Zusammensetzung nach einem der vorstehenden Ansprüche, worin das grenzflächenaktive Mittel 60 Gew.-% bis 100 Gew.-% eines anionischen grenzflächenaktiven Mittels umfaßt.
6. Zusammensetzung nach einem der vorstehenden Ansprüche, welche ferner 1 % bis 20 % eines gewebeweichmachenden Tonmaterials umfaßt.
7. Zusammensetzung nach einem der vorstehenden Ansprüche, welche ferner 0,5 % bis 5 % einer wasserlöslichen quaternären Ammoniumverbindung der Formel $\text{R}_4\text{R}_5\text{R}_6\text{R}_7\text{N}^+\text{X}^-$ umfaßt, worin R_4 für ein Alkyl mit 10 bis 20 Kohlenstoffatomen steht, R_5 , R_6 und R_7 unabhängig voneinander C_1 - C_4 -Alkyl darstellen und X^- ein Anion bedeutet.
8. Zusammensetzung nach einem der vorstehenden Ansprüche, welche ferner dadurch gekennzeichnet ist, daß sie von wasserunlöslichen langkettigen Alkylaminen oder Derivaten hiervon im wesentlichen frei ist.
9. Zusammensetzung nach einem der vorstehenden Ansprüche, dadurch gekennzeichnet, daß der pH-Wert einer 1%igen Lösung der Zusammensetzung in destilliertem Wasser von 8,5 bis 9,5 beträgt.

